

Professor Peta Ashworth Chair in Sustainable Energy Futures Renewable Gas in Australia Conference, Sydney 6<sup>th</sup> June, 2019



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# The Australian public's perception of hydrogen for energy





#### Acknowledgements and Thanks:

Dr Vikki Lambert - Co-Author and researcher on the project with me

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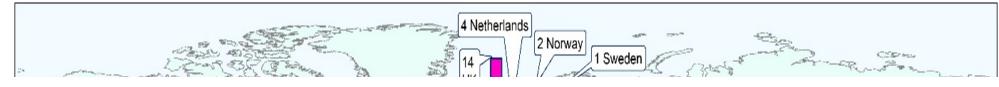


### Key Messages

- The Australian public are supportive of the opportunities that are emerging from a potential hydrogen industry
- The use and the management of Australia's valuable water resources and any associated land use change were deemed critical for community support.
- Major concerns centred around costs, safety of the environment and people



#### **International studies**



49 papers in total 26 assessed the public's perception of hydrogen in the transport sector Hydrogen powered buses (n=8) and cars (n=8) Hydrogen fuelled shipping (n=1) Refuelling stations (n=7).





#### **Research aims**

The main objectives were to:

- identify the current knowledge and understanding of hydrogen in the Australian public through a literature review,
- ascertain the potential barriers and enablers for the development of a hydrogen industry in Australia,
- understand how these barriers may be influenced by various demographic factors such as age, gender, location, socio-economic status and cultural background,
- test a number of hydrogen industry scenarios with the Australian general public,
- identify policy and regulatory considerations and outline the potential opportunities and challenges that may arise as a result of the public's response to the hydrogen industry scenarios, and
- make recommendations on potential ways for hydrogen projects to ameliorate challenges and build on the opportunities that emerge from this research.



#### **Focus Group Demographics**

Location	Age Group	Age Range	Female	Male	Total
Adelaide, SA	56+	56-72	4	4	8
Adelaide, SA	34-54	35-53	6	4	10
Adelaide, SA	18-34	21-33	6	5	11
Whyalla, SA	45+	50-76	7	3	10
Whyalla, SA	18-45	29-47	5	1	6
Melbourne, VIC	56+	60-74	4	6	10
Melbourne, VIC	34-54	35-44	5	4	9
Melbourne, VIC	18-34	20-33	8	2	10
Traralgon, VIC	45+	47-76	5	4	9
Traralgon, VIC	18-45	20-45	5	4	9
TOTAL		20-76	55	37	92



#### Focus group questions...

*"I want to know more about the environmental impacts and what other offsets or derivatives are going to be left" [FG3]* 

"What's the actual production facility going to be like? Because I know there's a lot of backlash against some renewable ones – people are like, well, I don't want a wind farm next to my house." [FG8]

"...how many years do you keep using coal as a source and what does that do to the environment?" [FG3]

"...I'd have some concerns about safety issues, both environmental and industrial, because it is still a highly volatile gas, and I would hate to see a spark setting off something, so I'd have concerns both about environmental production and also industrial." [FG6]



#### Concerns about water

So water might be an issue for South Australia because we have really so little water." [FG1]

"South Australia is the driest state in the driest continent on Earth" [FG2]

"You are saying renewables with water. Do we currently have a surplus of water in Australia? You ask people in NSW, the farmers, they are fighting over water. If they went down that path, where is that extra water going to come from?" [FG9]



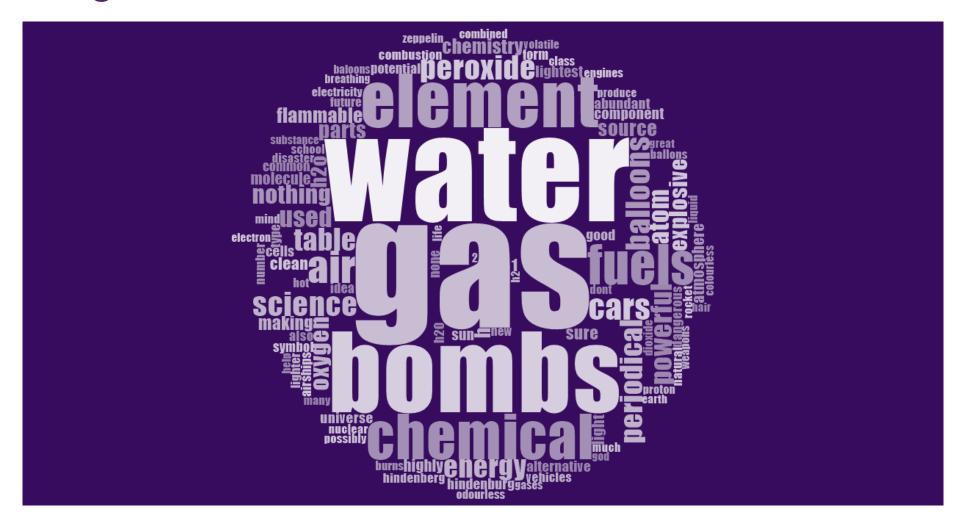
### Survey demographics

Demographic	Category	Stream A: Transport	Stream B: Domestic Use	Stream C: Export	Total
Gender	Male	463	435	487	1385
		48.8%	47.2%	53.2%	49.7%
	Female	482	484	427	1393
		50.8%	52.6%	46.6%	50.0%
	Other		2	7	
		0.3%	0.2%	0.2% 0.3	0.3%
	TOTAL	948	921	916	2785
		34.0%	33.0%	33.0%	100.0%
Age	18 to 34	274	266	232	772
		28.9%	28.9%	25.3%	27.7%
	35 to 54	333	333	356	1022
		35.1%	36.2%	38.9%	36.7%
	55+	341	322	328	991
		36.0%	35.0%	35.8%	35.6%

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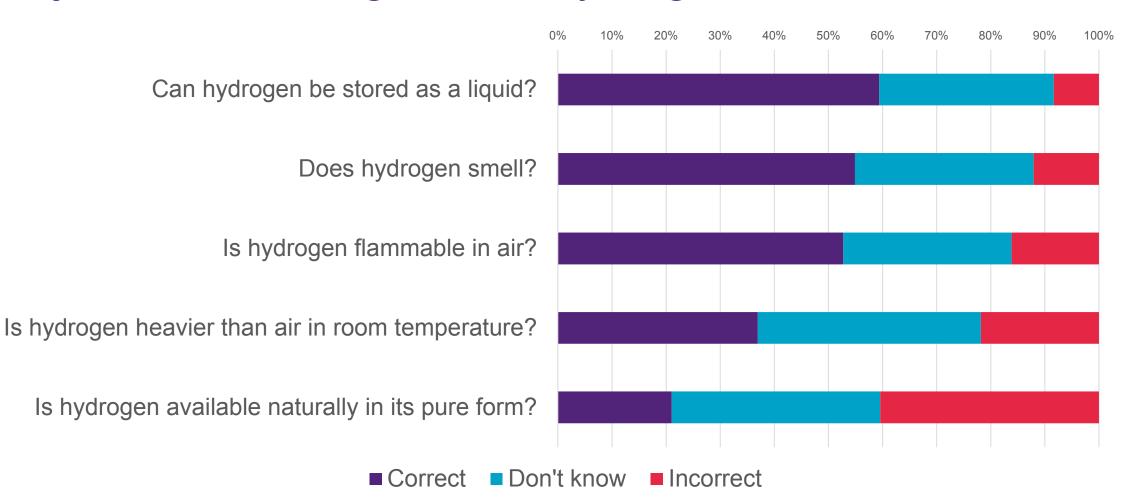


#### First thing that comes to mind





#### Objective knowledge about hydrogen



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CRICOS code 00025B



#### Familiarity with hydrogen production and its uses

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
ogen in fuel cell vehicles											
w hydrogen is produced											
rogen refuelling stations											
lacement for natural gas											
ge medium for electricity											
ogen fuel cells in homes											
of it I have heard o	f it	■   kr	now a	bout it	and o	could c	descrit	be it to	a frie	nd	

The use of hydro

Ho

Hydi

Burning hydrogen as a repl

Hydrogen as an energy storag

The use of hydro

I have never heard of it I have heard of it

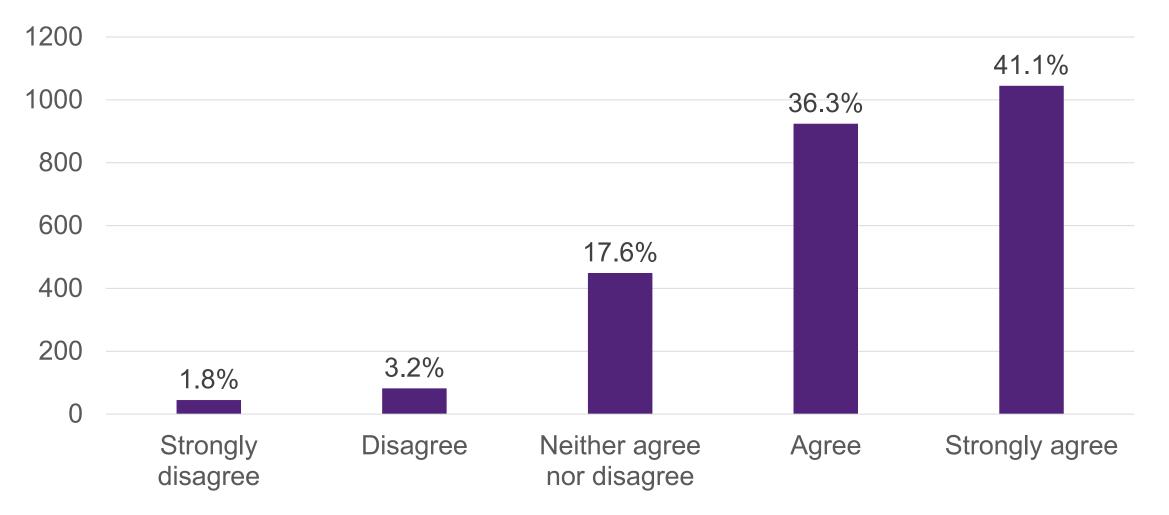


#### Safety as major concern





#### Trust in adequate safety concerns





#### Source of production matters

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Hydrogen should be produced using renewable energy and electrolysis only											
Hydrogen should be produced using fossil fuels with CCS as an intermediate step while transitioning to renewables											
9											
Hydrogen should be produced using fossil fuels with CCS indefinitely											
Strongly disagree	er ag	gree i	nor di	sagre	e 🗖	Agree	e 🔳	Stron	gly ag	Iree	



#### Source of production matters

"...regardless of climate change, we should be trying to do renewables anyway." [FG3]

*"When you think of brown coal, you think dirty...and if they are trying to use brown coal to actually then extract things, then why would you use something that is actually dangerous to the environment, and then possibly causing more emissions and more harm to the environment?" [FG7]* 

*"If this is the way forward then that's great, and if we use coal as a means of getting there then I don't have a problem with that either."* [FG1]

*"It is important to transition obviously from fossil fuels, but in terms of managing risk, it would make sense to do both concurrently until whatever process is appropriate and successful."* [FG8]



#### Potential domestic uses

Hydrogen should be used increasingly for the energy supply in Australia

I would be happy to use hydrogen for hot water heating

I would be happy to use hydrogen for on-site electricity generation

I would be happy to use natural gas that contains some hydrogen

I would be happy to use hydrogen for space heating

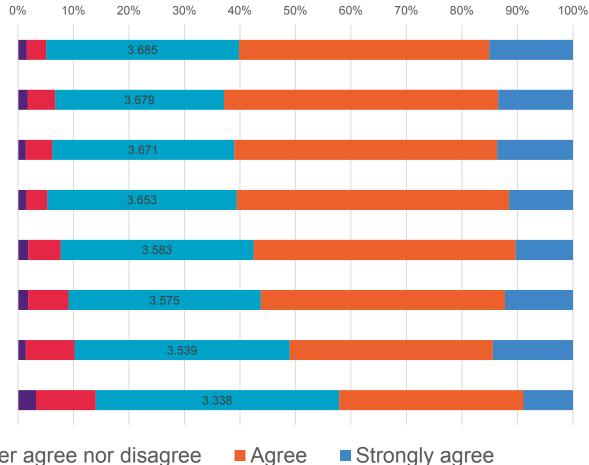
I would be happy to use hydrogen for cooking

I fear that hydrogen would be too expensive for the energy supply I would have no concerns if hydrogen were stored

underground like natural gas

Strongly disagree Disagree

Neither agree nor disagree





### Terminology

Hydrogen was blended (up to 10%) into existing natural gas networks

Hydrogen was piped (up to 10%) into existing natural gas networks

Hydrogen was injected (up to 10%) into existing natural gas networks

Natural gas was replaced with 100% hydrogen in existing gas networks

Gas networks were replaced with 100% electrification

0%	5 10	0% 20	0% 30	40	0% 50	% 60	)% 70	)% 80	90% 90	0% 100%
			3.61							
			3.58							
			3.57							
				3.33	8					
					3.12					

Very unsupportive Unsupportive Neither supportive or unsupportive Supportive Very supportive



#### Recommendations

In addition to the development of a long term strategy for hydrogen in Australia we recommend:

- Ongoing engagement with all stakeholders around emerging hydrogen trials and new projects
- Ensuring communication materials do not assume any prior knowledge of hydrogen
- Proactively sharing safety considerations in public engagement activities and communication materials
- A coordinated approach between government, industry and academia which aims to bring the public along with the developments occurring in the hydrogen space
- Raising awareness of the benefits and opportunities presented to Australia by developing a hydrogen industry.



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## Thank you

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